Aug. 15, 1967

F. ZEUNERT

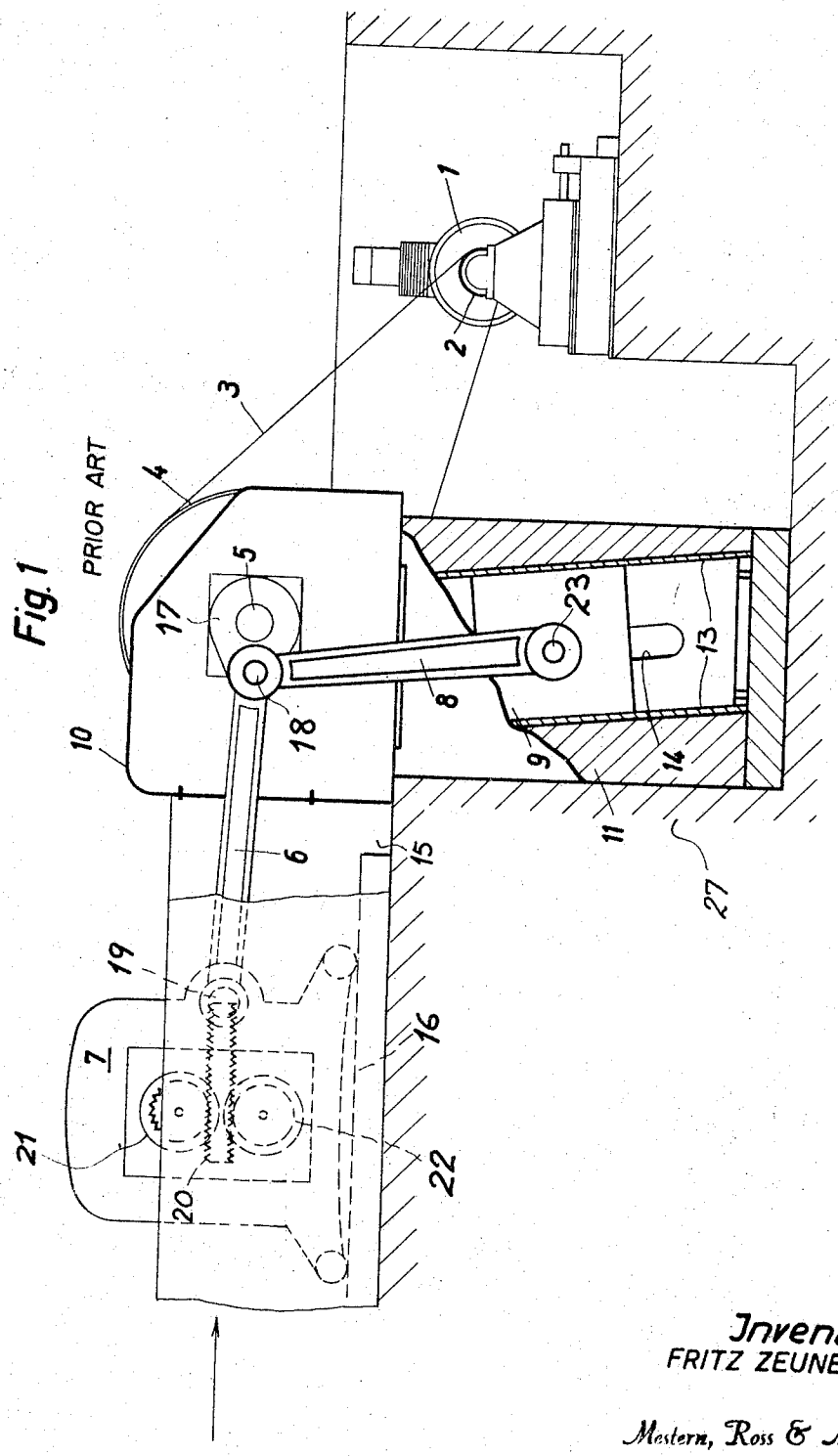
3,335,593

DRIVE FOR ROLLING MILL

Filed Aug. 26, 1964

3 Sheets-Sheet 1

Fig. 1
PRIOR ART



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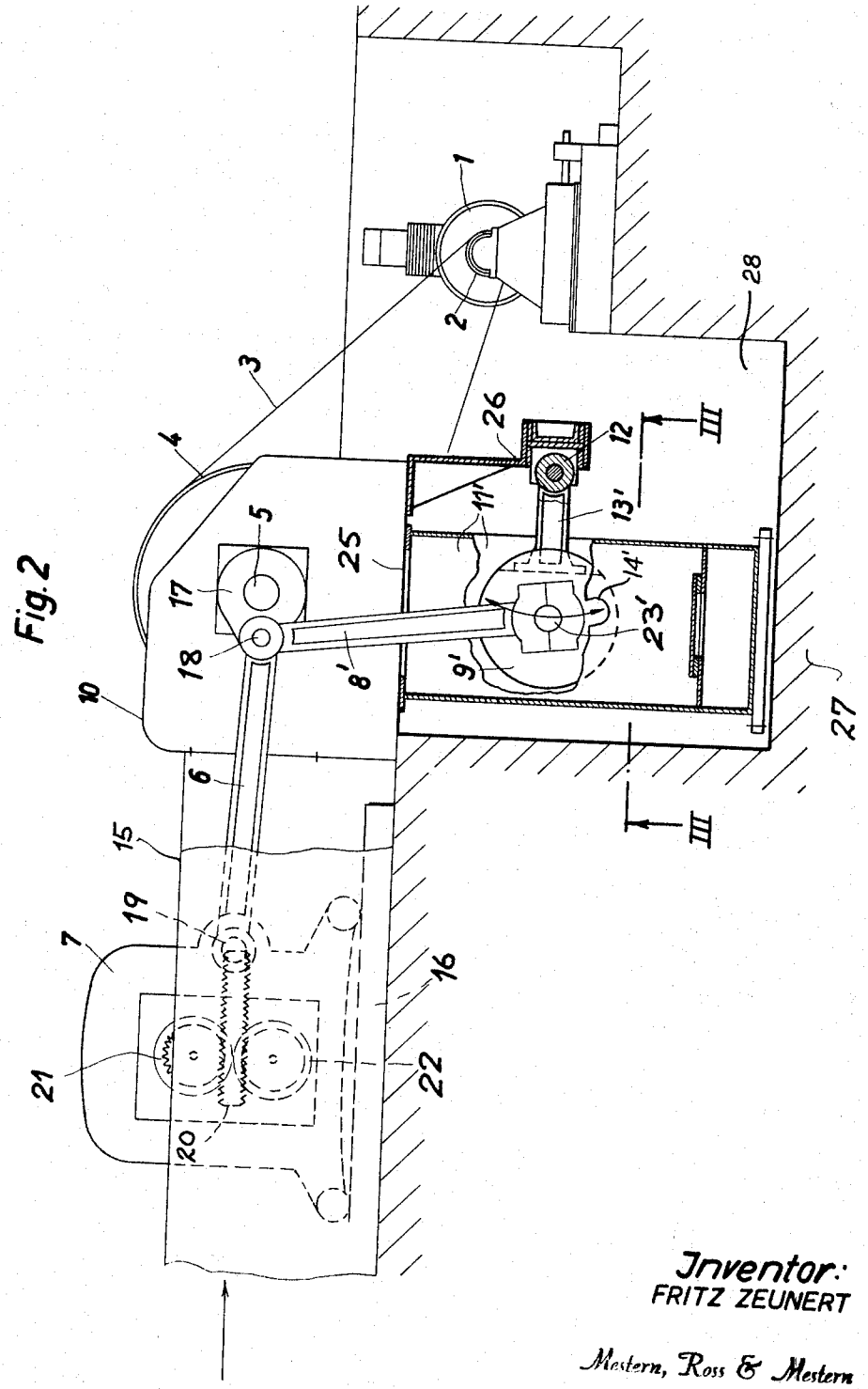

Fig. 2

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3 Sheets-Sheet 3

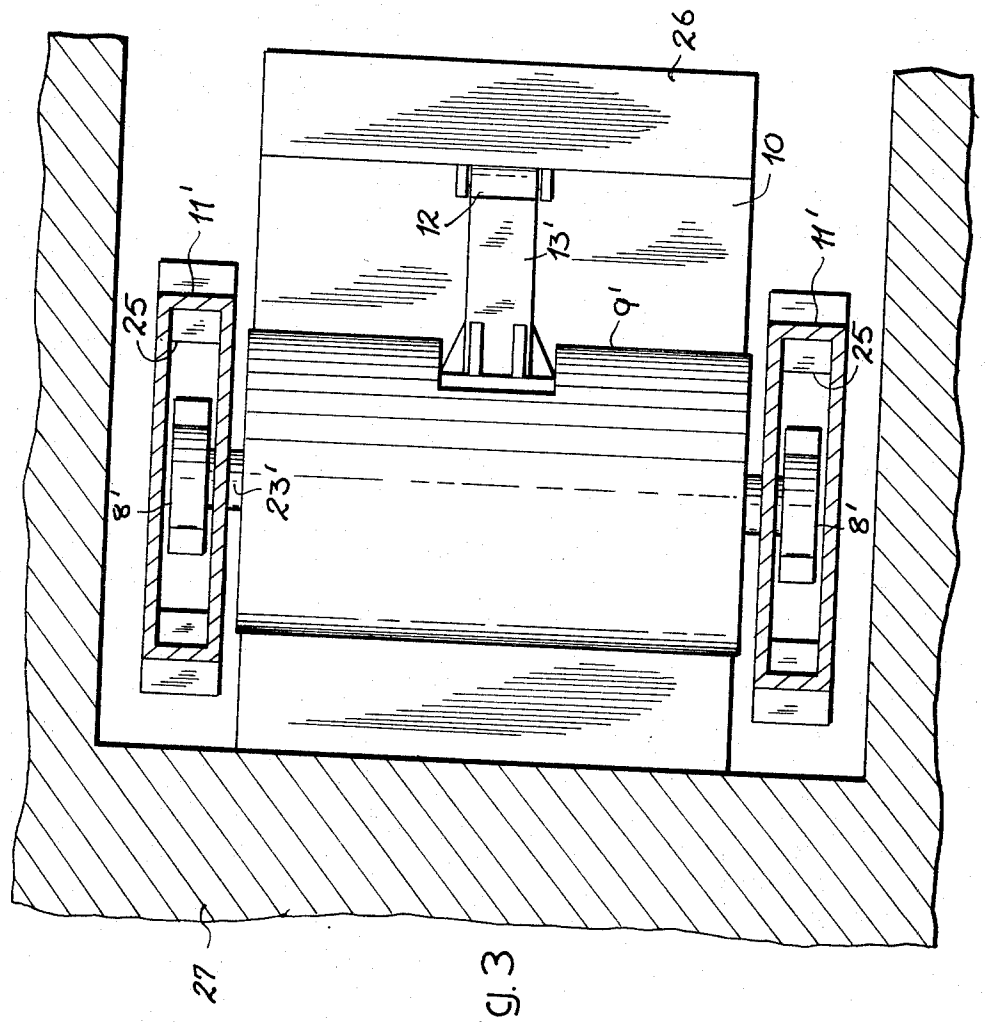

Fig. 3

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DRIVE FOR ROLLING MILL

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Claims priority, application Germany, Aug. 27, 1963, M 57,975
3 Claims. (Cl. 72—249)

My present invention relates to a rolling mill of the type in which metal bars, sheets or other elongated stock undergo progressive reciprocating motion while being flattened by one or more roller pairs that are journaled in a movable frame.

A rolling mill of this type, used for the cold deformation of sheet steel or similar material, usually comprising a generally horizontal track on which the roller frame is reciprocable by means of a continuously rotating crank. In order to insure continuity and smoothness of motion, having regard to the considerable inertia of the masses that must be accelerated, it is customary to connect the crank not only to a pitman or pair of pitmans linking it with the roller frame but also to a pair of rods having a compensating weight attached thereto, this weight having the shape of a piston guided in a cylinder for generally vertical reciprocation. The cylinder is usually disposed directly beneath the crankcase to form an oil sump for the latter, its own lubrication being thus performed by the oil dripping from the crankcase. In this manner, the weighted rods pass through the midposition of their piston stroke when the pitman is at dead center, and vice versa, whereby the crank is able to turn at a steady rate and objectionable vibrations are prevented even at high rotative speeds.

It has been found in practice, however, that systems of this description use up a large amount of lubricant, e.g., up to 100 liters of oil in a single operating shift. This consumption of lubricant, which not only is expensive but also creates a problem of maintenance and servicing, is due to the rapidly changing air pressure in the nearly closed cylinder surrounding the piston-shaped counterweight; thus, the ascending counterweight tends to eject some of the accumulated oil through the lateral cylinder slots in which the counterweight gudgeons are guided, whereas upon its subsequent descending stroke the counterweight aspirates oil from the overlying crankcase along with air from the region of the roller frame which is frequently enriched with ambient cooling fluid and contaminates the lubricant.

I have found, in accordance with the present invention, that the aforedescribed disadvantages can be avoided by elimination of the piston-and-cylinder relationship between the counterweight and its guide means, the weighted connecting rods being instead articulated to one end of a guide arm which is generally parallel to the frame-operating pitman and whose other end is pivoted to a fixed support. According to a more particular feature of my invention, this support is rigid with the wall of a housing which forms the oil sump beneath the crankcase and in which the lower ends of the connecting rods as well as the counterweight are received with all-around clearance.

The invention will be described in greater detail with reference to the accompanying drawing in which:

FIG. 1 is a side-elevational view, partly in section, of a rolling mill representing the prior art described above;

FIG. 2 is a view similar to FIG. 1, illustrating my present improvement; and

FIG. 3 is a cross-sectional view taken on line III—III of FIG. 2.

I shall first describe those elements which are common to the conventional rolling mill of FIG. 1 and the improved arrangement of FIGS. 2 and 3. These elements include a machine frame **15** forming a horizontal track **16** on which a roller frame **7** is reciprocable under the action of a crank **17** whose shaft **5** is driven from a motor **1** via a small pulley **2**, a belt **3**, and a large pulley **4** on shaft **5**. A pair of parallel pitmans **6** are disposed on opposite sides of a crankcase **10** surrounding the crank **17** and its shaft **5**, each of these pitmans having one end articulated at **18** to the crank **17** and at **19** to the reciprocable roller frame **7**. Two racks **20** on frame **15** drive the two coacting rollers **21**, **22** so that a metal sheet or other elongated stock, not shown, is advanced from left to right through the gap between these rollers and is flattened in the process. Superimposed upon this linear feed motion, which is due to the rotation of the rollers, is a reciprocating motion derived from the crank **17** whereby the stock is repetitively machined along overlapping sections of its length.

In addition to the substantially horizontal pitmans **6**, a pair of nearly vertical rods **8** are articulated at **18** to the crank **17**. These rods engage gudgeons **23** on a counterweight **9** within a housing **11** having lateral slots **14** for these gudgeons, the sides **13** of the housing slidably engaging the counterweight **9**.

The foundation is shown at **27**.

The disadvantages of an alternate aspiration and expulsion of fluid through the slots **14**, as also the need for providing a precisely machined guide surface for the weight **9**, are eliminated in the improved system shown in FIGS. 2 and 3 where the rods **8'** pass through slots **25** in two sump housings **11'** extending laterally beyond the crankcase **10**, the counterweight **9'** being a cylinder rotatable about a shaft **23'** whose ends are engaged by these rods. The counterweight **9'** is further secured to a guide arm **13'**, which is pivoted at **12** to a support **26** rigid with crankcase **10**, for swinging about a horizontal axis parallel to that of shaft **5**. It will be noted that arm **13'** is approximately parallel to the generally horizontal pitmans **6** and generally perpendicular to the rods **8'**. Housings **11'**, laterally spaced apart in a well **28** of foundation **27**, have confronting sidewalls formed with slots **14'** which are traversed by shaft **23'**.

It will be apparent that the linkage **8'**, **9'**, **13'** does not act as a piston in the housings **11'** so that its reciprocal motion does not entail any wasteful expenditure of lubricating oil or the objectionable admixture of contaminants therewith, the counterweight **9'** being situated between the two housings **11'**. Moreover, the pivotal mounting **12** of the guide arm **13** represents a considerably simpler structure than the piston cylinder **11** of FIG. 1.

My invention is, of course, not limited to the specific arrangement described and illustrated but may be realized in modified form without departing from the spirit and scope of the appended claims.

I claim:

1. A drive for a rolling mill, comprising a crank; a crankcase surrounding said crank; drive means for rotating said crank about a horizontal axis; a foundation forming a well underneath said crankcase; a pair of parallel connecting rods each having an upper end articulated to said crank and extending downwardly into said well in a vertical plane perpendicular to said axis; a horizontal shaft spanning to the lower ends of said rods; a counterweight rotatably carried on said shaft, a stationary support below said crank; a generally horizontal arm rigid with said counterweight and pivoted to said stationary support; a generally horizontal pitman generally parallel to said arm articulated to said crank; a frame joined to said pitman for reciprocation in a direc-

tion transverse to said axis upon rotation of said crank; and roller means journaled in said frame for advancing elongated stock in said direction and flattening said stock.

2. A drive as defined in claim **1**, further comprising a pair of spaced-apart upwardly open housings in said well each receiving the lower end of a respective connecting rod, said housing having confronting sidewalls formed with slots traversed by said shaft.

3. A drive as defined in claim **1** wherein said counterweight is generally cylindrical.

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